

**Remarks/Arguments**

Claims 2-7 and 10-20 remain in this application.

The examiner has stated that the title is not descriptive.

The examiner has rejected claims 1-4, 8, 9 and 16 under 35 USC 102(e) as being anticipated by *Tsuji* (6,906,794).

The examiner has rejected claims 5-7, 10-15 and 17-20 under 35 USC 103(a) as being unpatentable over *Tsuji*.

In view of these remarks and the above amendments, reconsideration of the above noted rejections and objections is respectfully requested.

**Title:**

The title "Wafer Edge Defect Inspection" has been amended to "Wafer Edge Defect Inspection Using Captured Image Analysis" as required by the office action.

**Rejections under 35 USC 102(e) and 103(a):**

Applicant respectfully traverses the rejection of **claims 2-4 and 16** under 35 USC 102(e) as being anticipated by *Tsuji* and the rejection of **claims 5-7, 10-15 and 17-20** under 35 USC 103(a) as being unpatentable over *Tsuji*. Since these two grounds of rejection are based on the same reference, they will be treated here together. **Claims 1, 8 and 9** stand rejected under 35 USC 102(e) as being anticipated by *Tsuji*, but have been canceled by the above amendments. Additionally, **claims 2, 4, 6 and 7** previously depended from claim 1, but have been amended into independent form including all of the limitations of the base claim. **Claims 6 and 7** have been further amended herein. Thus, the independent claims under these rejections are **claims 2, 4, 6, 7, 10, 13 and 16**, which will be discussed first.

**Claims 6 and 7:**

Independent **claim 6** recites:

**comparing** the defect information recorded after the first process step to the defect information recorded after the second process step; and  
**identifying** any new defects as **added defects** due to the second process step.

Independent **claim 7** recites:

**comparing** the defect information recorded after the first process step to the defect information recorded after the second process step ;  
determining whether any defects identified after the first process step have been **reduced** after the second process step; and  
**identifying** any such reduced defects as **repaired defects**.

(Amendments to these limitations are supported in the Specification at page 3, lines 27-29; and at page 5, line 27 to page 6, line 13.) Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. The office action states that “repeatedly inspecting the same area or portion of an inspected object or wafer for ensuring a complete inspection performance would have been obvious to one of ordinary skill in the inspection art.” Applicant respectfully submits, however, that whereas an “inspection” may imply a review of the results of the inspection and whereas a “repeated inspection” may imply a review of the new results, there is **no** necessary implication or suggestion that the two results will be **compared** to each other. **Additionally**, such repeated inspection and review of results cannot imply or suggest that any “**added defects**” or “**repaired defects**” will necessarily be **identified** during the subsequent review of results. Applicant respectfully submits, therefore, that independent **claims 6 and 7** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **comparing** defect information and/or **identifying** any new defects as **added defects** or reduced defects as **repaired defects**.

**Claim 13:**

Independent **claim 13** recites:

correlating each recorded image with the wafer from which it was taken and **the process step after which it was taken.**

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose only that image data, related defect data, "the coordinates and the rotating angle of a portion [of the wafer] being observed," and a wafer identification number may be correlated. (See column 6, lines 62-65; column 7, lines 1-6 and 54-56; column 11, lines 34-42.) *Tsuji* does not appear to disclose, however, that this information is correlated with the **process step** after which the recorded image was taken. Applicant respectfully submits, therefore, that independent **claim 13** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest that each recorded image is correlated with the **process step after which it was taken.**

**Claim 2:**

Independent **claim 2** recites:

positioning the wafer with an edge thereof relative to a **scanning electron microscope;**

...

scanning the edge of the rotating wafer with the **scanning electron microscope;**

recording an image of the scanned wafer from the **scanning electron microscope** into a database

...

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose only an optical image capturing device. (See column 4, lines 23-26; column 6, lines 39-50 and 54-61.) A scanning electron microscope is not an optical device. Applicant respectfully submits, therefore, that independent **claim 2** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest the use of a scanning electron microscope as claimed.

**Claim 4:**

Independent **claim 4** recites:

**positioning** the image capturing device at a desired angle relative to the edge of the wafer.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* does not appear to disclose that the imaging device 100 and the objective lens 60 can be "positioned." Therefore, it appears that the angle of the imaging device is **fixed**. Applicant respectfully submits, therefore, that independent **claim 4** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest **positioning** the image capturing device at a desired angle.

**Claims 10 and 16:**

Independent **claim 10** recites:

**automatically** inspecting an edge of the wafer in a first inspection station;  
**automatically** recording a first set of defects in the edge of the wafer;  
...  
**automatically** inspecting the edge of the wafer in a second inspection station; and  
**automatically** recording a second set of defects in the edge of the wafer.

Independent **claim 16** recites:

an image capturing device ..., the image capturing device **automatically** generating an image of the edge of the wafer;  
a database ..., the database **automatically** storing the received image for subsequent analysis.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, *Tsuji* appears to disclose that the edge inspection is **manual**, rather than **automatic**, since a user must use the joy stick pointing device 50 to control the position and rotation of the table 21 on which the wafer 2 is placed. (See column 4,

lines 41-55; and Fig. 2.) Applicant respectfully submits, therefore, that independent **claims 10 and 16** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **automatic** inspection and recording of sets of defects or **automatic** generating and storing of an image.

**Dependent Claims:**

**Claims 3, 5, 11, 12, 14, 15 and 17-20** depend either directly or indirectly from independent claims 2, 4, 10, 13 or 16. Applicant respectfully submits, therefore, that **claims 3, 5, 11, 12, 14, 15 and 17-20** are also not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least for the same reasons.

**Dependent Claim 3:**

Dependent claim 3 recites:

**setting an angle of the image capturing device** relative to the edge of the wafer, **a brightness of an illumination source** that illuminates the edge of the wafer, and an **accelerating voltage of an electron beam**.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, whereas *Tsuji* appears to disclose that some parameters can be set, *Tsuji* does not appear to disclose that the claimed parameters in claim 3 can be set. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claim 3** is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest **setting** these parameters.

**Dependent Claims 11 and 12:**

Dependent claim 11 recites:

**determining a difference between the first and second sets of defects.**

Dependent claim 12 recites:

**identifying process-induced edge defects** from the determined difference between the first and second sets of defects.

Applicant respectfully submits that *Tsuji* does not teach or suggest this limitation. Instead, similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will **determine a difference** between the results and/or **identify process-induced edge defects** therefrom. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 11 and 12** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest **determining a difference** between sets of defects and/or **identifying process-induced edge defects** from the determined difference.

**Dependent Claims 14 and 15:**

Dependent **claim 14** recites:

**selecting a recorded image ... by specifying ... the process step after which it was taken.**

Dependent **claim 15** recites:

**selecting two recorded images ... by specifying ... the two process steps after which each selected image was taken;**  
... and  
**determining whether any defects were added to the edge of the specified wafer ...**

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Instead, since *Tsuji* does not appear to disclose that any information is correlated with the **process step** after which the recorded image was taken (see arguments above regarding claim 13), *Tsuji* also does not appear to disclose that a recorded image can be **selected by specifying** the process step. Additionally, similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will determine whether any

**defects were added.** Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 14 and 15** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest that a recorded image can be **selected by specifying** the process step after which it was taken. Additionally, Applicant respectfully submits that in addition to the above arguments, dependent **claim 15** further is not anticipated by, is not obvious in view of, and is patentable over *Tsuji* at least because the reference does not teach or fairly suggest determining whether any **defects were added** to the edge of the specified wafer.

**Dependent Claims 18 and 19:**

Dependent **claim 18** recites:

the computer compares and analyzes the first and second images together ... to determine **whether any defects have been added** to the edge of the wafer between times that the first and second images thereof are generated.

Dependent **claim 19** recites:

the computer compares and analyzes the first and second images together ... to determine **whether any defects have been repaired** on the edge of the wafer between times that the first and second images thereof are generated.

Applicant respectfully submits that *Tsuji* does not teach or suggest these limitations. Similar to the arguments above regarding independent claims 6 and 7, although repeated inspections may imply a review of each new set of results, there is no necessary implication or suggestion that the review of the results will determine whether any **defects were added or repaired**. Applicant respectfully submits, therefore, that in addition to the above arguments, dependent **claims 18 and 19** are not anticipated by, are not obvious in view of, and are patentable over *Tsuji* at least because the reference does not teach or fairly suggest that it can be determined whether any **defects were added to or repaired on** the edge of the wafer between times that first and second images thereof are generated.

Appl. No. 10/628,614  
Amdt. Dated October 12, 2005  
Reply to Office action of July 13, 2005

For the reasons specifically discussed above, and others, it is believed that claims 2-7 and 10-20 define patentable subject matter. Reconsideration of the previous rejections as they might apply to these claims is therefore respectfully requested. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

October 12, 2005  
Date

Respectfully submitted,



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